

REMARKS

A three month extension fee has been included with this amendment.

It is noted that the drawings are accepted as informal drawings, but that new formal drawings will be required upon allowance of the application.

The specification was objected to for various informalities cited in item 2.

The specification has been amended above to correct the informalities.

Additional informalities were found and there were also corrected.

Claim rejections under 35 U.S.C. § 102

In item 3, claims 1, 2 and 22 are rejected as being anticipated by Franchville (US Patent No. 5,994,905). It is asserted that Franchville teaches a method for determining integrity of a cable under test that uses frequency domain reflectometry.

Applicant respectfully traverses the rejection of claims 1, 2 and 22 in light of Franchville. There are several critical distinctions that can be made that demonstrate that Franchville does not anticipate nor make obvious the claims of the present invention.

First, it is important to understand that the term "frequency domain reflectometry" (FDR) refers to a measuring system that can be implemented many different ways in hardware. Furthermore, using FDR does not mean that you are obtaining identical information, or information that can be used in the same manner. FDR simply means that a system uses a single frequency sine wave as the test function.

Accordingly, Applicant begins by observing that the incident and reflected signals are combined on the wire (cable under test). They are analyzed as combined signals. This aspect of Franchville is like the Medelius patent for Standing Wave Reflectometry (SWR) as taught in US Patent No. 5,977,773, titled Non-Intrusive Impedance-Based Cable Tester. This type of system is referred to in the present application when explaining SWR. In the present invention, two directional couplers (Fig. 1, items 21, 23, and Fig. 2, items 106, 108) or equivalent devices are used to separate the incident and reflected signals prior to being analyzed. This aspect of the present invention is claimed, and is not present in Franchville. Applicant has amended claim 1 to make clearer this aspect of the present invention. Please see independent claims 1, 21, and 24 of the present application wherein the input signal is claimed as being divided before it is sent to the cable under test. As this aspect is not claimed or even taught by Franchville, this should be sufficient to overcome the 102 rejection. However, it is useful to examine the result of this difference to understand why Franchville also teaches away from the present invention.

One reason that splitting the input signal has a critical effect on the present invention is demonstrated when the waves are analyzed separately on branched networks of wires. In a branched network (where several wires branch off from one or more junction points along the wire), the peaks in the spectral domain will correspond to the reflections and multiple reflections from each junction and the end of each wire. When the signals are analyzed combined, as taught by Franchville, the peaks correspond to these same

reflections and multiple reflections, but also to the sum and difference of all of the reflections and multiple reflections. This makes it virtually impossible to correctly predict the location of a fault on a branched network.

Another important advantage of the present invention is related to the effect of using the directional couplers. Specifically, Franchville teaches away from the present invention because of Franchville requires and teaches that there must be adjustments for attenuation and magnitude.

Another important difference between the present invention and Franchville is much less obvious because of the hardware being used. The same hardware is being used to perform a different function. Specifically, in Franchville, the mixer is used to multiply two sinusoidal incident signals. These signals are simultaneously placed on the line after filtering them. This is analogous to running with more than one incident frequency.

In contrast, the present invention teaches and claims that there is only one incident frequency present on the cable under test. In the present invention, the mixer is used to multiply the received and incident waves, not to multiply two incident waves as taught in Franchville. Thus, the mixer performs a different function.

Another important difference between the present invention and Franchville is that Franchville requires a broadband detector in the measurement circuit. The broadband detector is used to measure the magnitude of the high frequency RF signal. In contrast, the present invention teaches and claims using the mixer and A/D converter to perform

measurements. The mixer in Franchville is not used as part of the measurement circuit. Although there are similar components, the components are used in different ways and for different purposes.

Regarding claim 2, it is asserted that Franchville teaches obtaining data regarding integrity of the CUT by determining impedance of the CUT at a point of termination.

For the reasons given above for differentiating claim 1, it is again noted that using the circuitry and method of Franchville, it is virtually impossible to correctly predict the location of a fault on a branched network. Furthermore, claim 2 is dependent upon a patentable claim.

Regarding claim 22, it is assumed that the Office Action meant to refer to independent claim 21. Applicant respectfully traverses the rejection of claim 21 for the same reasons given in support of claim 1. Furthermore, claim 21 has also been amended to more distinctly claim the aspect of the present invention where the input signal is divided into two separate signals before being sent to the cable under test.

For the reasons given above, claims 1, 2, and 21 of the present invention as taught and claimed are not anticipated, nor made obvious by Franchville.

Claim rejections under 35 U.S.C. § 103

Before addressing the specific obviousness rejection, Applicant wishes to clarify what is required to support an obviousness rejection. The Office Action

must establish a prima facie case of obviousness to meet the burden of ' 103.

The PTO has the burden under section 103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.

In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988) (citations omitted). In establishing a prima facie case of obviousness, the PTO "cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." Id. at 1600. Rather, "[t]he test is whether the claimed invention as a whole, in light of all the teachings of the references in their entireties, would have been obvious to one of ordinary skill in the art at the time the invention was made." Connell v. Sears, Roebuck & Co., 220 U.S.P.Q. 193, 199 (Fed. Cir. 1983).

Applicant submits that the Office Action does not make a prima facie case of obviousness in that it does not show either (a) some objective teaching in the prior art that suggests combining the references, or (b) knowledge generally available to one of ordinary skill in the art which would lead that individual to combine the relevant teachings of the references to achieve the invention claimed, or c) that the combined inventions would result in the claimed invention. See In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). With these requirements in mind, we look at the specific rejections.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franchville in view of Richardson (US Patent No. 6,014,464).

It is asserted that Franchville does not teach detecting open or short circuits, but that Richardson does.

Applicant respectfully traverses the rejection of the claims in light of Franchville and Richardson. First, for all the reasons given above, Franchville does not anticipate not make the present invention obvious because of the different hardware, the differences in the signal path, and different method of using the hardware that is similar. Furthermore, Richardson teaches digitizing the signals and then analyzing them using software. The present invention does not teach using software to analyze the signals. Furthermore, Richardson teaches away from the present invention because the frequencies used could not be implemented by Richardson today because of limitations on the speed of A/D converters.

In item 5, claims 5-7 and 19-21 are rejected as being unpatentable over Franchville in view of Richardson and further in view of Bjork. Bjork is asserted to teach the claimed elements.

Applicant respectfully traverses the rejection of claims 5-7 and 19-21. The Bjork patent teaches Time Domain Reflectometry, where the "pulse" is a literal pulse sent down the cable. The slopes and levels of this pulse are used to determine the length of the line. The Bjork patent does not "mix" the signals in the same sense as either the Richardson patent or the present invention. These signals are naturally combined on the line (which is what Bjork means when he says "mixed"). Both Richardson and the present invention electronically "mix" two signals, but in this case, "mixing" means multiplying the signals using an

electronic device (the mixer). Richardson multiplies the signal on the line with itself (effectively squaring the combined signal). In contrast, the present invention multiplies the incident and reflected signals (which are separated using directional couplers). Thus Bjork and Richardson both teach away from the present invention.

It should be understood that the filtering that is performed in both Richardson and Bjork is very different and done for different purposes than in the present invention. In the area, the terms being used can mean entirely different things. In the case of Bjork, the words may be the same, but the concepts are unrelated.

Accordingly, claims 5-7 and 19-21 are not made obvious by the application of Richardson or Bjork with Franchville.

In item 6, claims 23 and 24 are rejected as unpatentable over Franchville in view of Bjork.

Applicant respectfully traverses the rejection of claims 23 and 24. Again, when Franchville refers to mixing the incident and reflected signals, he does not mean running them through a mixer and multiplying them as Applicant does in the present invention. Instead, Franchville is teaching that the signals are combined (effectively added) on the line itself.

In item 7, claim 25 is rejected as being unpatentable over Franchville in view of Bjork and further in view of Richardson.

Applicant respectfully traverses the rejection of claim 25. The only filtering that the present invention performs is in the data analysis (i.e. the

signals themselves are left unfiltered). The filtering performed in the data analysis is removal of the low "frequency" component of the DC value of the mixed signal (i.e. the FDR output). This low "frequency" signal corresponds to the zero-length reflection that occurs at the junction between the FDR and the wire. Thus, unlike Franchville, the present invention does not assume that the testing circuitry matches the wire under test, as the present invention is meant to be able to test many different types of wires. Accordingly, the present invention is not made obvious by the cited prior art.

Regarding claims 26 to 36, it is noted that the front page of the Office Action states that claims 1-34 are rejected. There are a total of 36 claims. Furthermore, the body of the Office Action never refers to claims 26 to 36, so Applicant does not know if they are rejected, objected to, or allowed, and respectfully requests information regarding these claims.

Double Patenting

Claims 1-34 are provisionally rejected as claiming the same invention as that of claims 1-18 and 21-36 of co-pending application 10/190314.

The claims of the co-pending application are to be amended.\

Conclusion

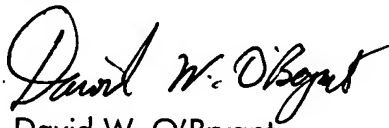
In light of the statements above, Applicant respectfully requests issuance of claims 1-36. If any impediment to the allowance of these claims remains after entry of this Amendment, and such impediment could be alleviated during

a telephone interview, the examiner is invited to call David W. O'Bryant at (801) 478-0071 so that such matters may be resolved as expeditiously as possible.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 50-0881.

DATED this 25th day of March, 2004.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "David W. O'Bryant", written in a cursive style.

David W. O'Bryant
Attorney for Applicant
Registration No. 39,793
MORRIS O'BRYANT COMPAGNI, P.C.
136 South Main Street, Suite 700
Salt Lake City, Utah 84101
(801) 478-0071 telephone
(801) 478-0076 facsimile